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Solar light-driven complete mineralization of aqueous gram-positive and gram-negative bacteria with ZnO photocatalyst

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Abstract

ZnO nanoparticles have been effectively used in water disinfection from two common types of gram-positive (*Enterococcus faecium*) and gram-negative (*Proteus mirabilis*) bacteria under simulated solar radiations by inactivation. Complete mineralization of organic contents that leach out of inactivated bacteria has also been achieved leaving no soluble organic matter in water. Bacterial inactivation and complete mineralization have been confirmed by plate counting, high performance liquid chromatography and total organic content measurement. Effects of different reaction parameters (pH, temperature, bacterial concentration, reaction time and ZnO catalyst loading) have all been studied. Control experiments with Cut-off filters confirm the role of the UV tail in solar simulated light in the photocatalytic process. The results highlight the feasibility of using ZnO photocatalyst in complete disinfection of water from both hazardous *Enterococcus* and *Proteus mirabilis* bacteria, leaving no organic matters after degradation. © 2019 Elsevier Ltd

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